

What is Claimed:

1 1. A method for treating a metal surface to minimize rust
2 formation, said method comprising the steps of:

3 contacting the metal surface with a cleaning solution to form a
4 cleaned metal surface;

5 rinsing said cleaned metal surface with water to form a rinsed
6 metal surface; and

7 contacting said rinsed metal surface with a pretreating solution
8 comprising a blend of water, an organo-functional silane, and a borate ester
9 to form a pretreated metal surface;

10 drying said pretreated metal surface to form a dried metal
11 surface; and

12 applying a decorative coating to said dried metal surface.

1 2. The method in accordance with claim 1, wherein:

2 said organo-functional silane is selected from the group
3 consisting of an aminopropyltriethoxy silane, a vinyl triethoxy silane, and a
4 Bis (gamma trimethoxysilylpropyl) amine and mixtures thereof; and

5 said borate ester is selected from the group consisting of
6 monoethanolamine borate and monoisopropanolamine borate and mixtures
7 thereof.

1 3. The method in accordance with claim 2, wherein:

2 said organo-functional silane is an aminopropyltriethoxy silane;
3 and

4 said borate ester is monoethanolamine borate.

1 4. The method in accordance with claim 1, wherein said
2 organo-functional silane and said borate ester are added in an amount to

3 achieve a coating weight of about 1.2 to about 6.5 mg per square foot on said
4 dried metal surface.

1 5. The method in accordance with claim 1, wherein said
2 organo-functional silane and said borate ester are added in an amount to
3 achieve a total weight percent of about 1.0% to about 4.0%.

1 6. The method in accordance with claim 5, wherein said
2 organo-functional silane and said borate ester are added in an amount to
3 achieve a total weight percent of about 1.5% to about 3.0%.

1 7. The method in accordance with claim 1, wherein said
2 cleaning solution comprises water and an alkaline-based cleaner.

1 8. The method in accordance with claim 7, wherein said
2 alkaline-based cleaner comprises potassium hydroxide.

1 9. The method in accordance with claim 1, wherein the step
2 of applying the decorative finish to said dried metal surface is done after
3 waiting at least 8 days.

1 10. The method in accordance with claim 1, wherein the step
2 of applying the decorative finish to said dried metal surface is done after
3 waiting at least 12 days.

1 11. The method in accordance with claim 1, wherein said
2 decorative finish comprises paint.

1 12. The method in accordance with claim 1, wherein the
2 metal surface comprises steel.

1 13. The method in accordance with claim 1, wherein the
2 rinsing step is carried out, in sequence, in a first stage using water at an
3 elevated temperature and a second stage using water at room temperature.

1 14. The method in accordance with claim 13, wherein the
2 elevated temperature of water at said first stage is between about 100°F and
3 140°F and the room temperature of water at said second stage is between
4 about 65°F and 75°F.

1 15. In a method for pretreating a metal surface in which a
2 cleaned metal surface is pretreated then dried in preparation for application
3 of a decorative coating to the dried metal surface, the improvement
4 comprising pretreating said cleaned metal surface by contacting said cleaned
5 metal surface with a pretreating solution comprising a blend of water, an
6 organo-functional silane, and a borate ester.

1 16. The method in accordance with claim 15 further
2 comprising rinsing the cleaned metal surface with water after the cleaning
3 step.

1 17. A composition for use in the treatment of a metal surface
2 comprising a blend of water, an organo-functional silane, and a borate ester.

1 18. The composition in accordance with claim 17, wherein:

2 said organo-functional silane is selected from the group
3 consisting of an aminopropyltriethoxy silane, a vinyl triethoxy silane, and a
4 Bis (gamma trimethoxysilylpropyl) amine and mixtures thereof; and

5 said borate ester is selected from the group consisting of
6 monoethanolamine borate and monoisopropanolamine borate and mixtures
7 thereof.

1 19. The composition in accordance with claim 18, wherein:
2 said organo-functional silane is an aminopropyltriethoxy silane;
3 and
4 said borate ester is monoethanolamine borate.

1 20. The composition in accordance with claim 17, wherein
2 said organo-functional silane and said borate ester are added in an amount to
3 achieve a total weight percent of about 1.0% to about 4.0%.

1 21. The method in accordance with claim 20, wherein said
2 organo-functional silane and said borate ester are added in an amount to
3 achieve a total weight percent of about 1.5% to about 3.0%.

1 22. A composition for use in the treatment of a metal surface
2 consisting of a blend of water, an organo-functional silane, and a borate
3 ester.

1 23. A method for treating a metal surface to minimize rust
2 formation, said method comprising the steps of:

3 contacting the metal surface with a combined
4 cleaning/phosphatizing bath to form a pretreated metal surface;

5 rinsing said pretreated metal surface with water to form a
6 rinsed metal surface;

7 sealing said rinsed metal surface by contacting said rinsed metal
8 surface with a sealing solution comprising a blend of water, an organo-
9 functional silane, and a borate ester to form a sealed metal surface;

10 drying said sealed metal surface to form a dried metal surface;

11 and

12 applying a decorative coating to said dried metal surface.

1 24. The method in accordance with claim 23, wherein said
2 combined cleaning/phosphatizing bath comprises a cleaning agent, an iron
3 phosphate pretreating composition, and water.

1 25. A method for treating a metal surface to minimize rust
2 formation, said method comprising the steps of:

3 contacting the metal surface with a cleaning solution to form a
4 cleaned metal surface;

5 rinsing said cleaned metal surface with water to form a rinsed
6 metal surface;

7 contacting said rinsed metal surface with a pretreating solution;

8 rinsing said pretreated metal surface with water to form a
9 rinsed metal surface;

10 sealing said rinsed metal surface by contacting said rinsed metal
11 surface with a sealing solution comprising a blend of water, an organo-
12 functional silane, and a borate ester to form a sealed metal surface

13 drying said sealed metal surface to form a dried metal surface;

14 and

15 applying a decorative coating to said dried metal surface.

1 26. The method in accordance with claim 25, wherein said
2 pretreating solution comprises an iron phosphate pretreating composition and
3 water.

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